



SIMCOE

**water pollution
control plant**

1968

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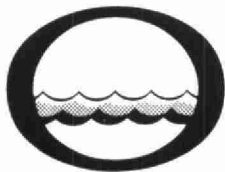
Division of Plant Operations

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Water management in Ontario

Ontario
Water Resources
Commission

135 St. Clair Ave. W.
Toronto 7
Ontario


We are pleased to present you with the Operating Summary for the water pollution control facilities operated for you during 1968.

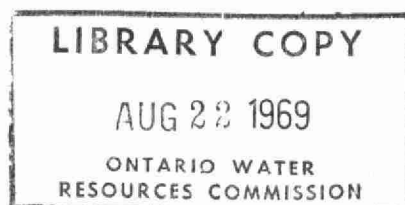
Both the financial and technical information presented should be of assistance to your present and future planning in this important phase of municipal activity.

A new format has been devised to allow greater readability with equally detailed content. We trust that this will meet with your approval.

Our staff wish to express their appreciation for your co-operation throughout the year.


D. S. Caverly,
General Manager.


D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.



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SIMCOE
water pollution control plant

operated for
THE TOWN OF SIMCOE

by the
ONTARIO WATER RESOURCES COMMISSION

1968 ANNUAL OPERATING SUMMARY

FOREWORD

● This operating summary outlines the project's technical capabilities and financial status in 1968. Such information mirrors past and present performance, but a major intention is to anticipate the future -- to solve problems before they occur.

The new format in which this year's data are presented is designed to offer a higher level of readability than in the past, without a corresponding decrease in compactness, accuracy and detail.

Although your Regional Operations Engineer carries the major responsibility for the contents of the report, those involved in its preparation are attached to several Commission sections and divisions. The statistics section of the Division of Plant Operations compiled the information for the graphs and charts. The draughting section of the Division of Sanitary Engineering drew the graphs. The Division of Finance provided all cost data.

Only the close co-operation of these departments allowed the publication of this summary.

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'68 REVIEW

The total operating cost for 1968 was \$46,216.84 as opposed to \$45,987.82 in 1967. There was an increase in the total flow to the plant from the 621.104 million gallons treated in 1967 to 654.82 mg. This is reflected in a decrease in cost per million gallons to \$70.58 from \$74.04 in 1967. The five year average cost per million gallons is \$70.57.

In 1968, the total design hydraulic capacity at the two plants was exceeded 25% of the time as compared to 20% in 1967, 16% in 1966 and 10% in 1965.

The average BOD of 26 raw sewage samples was 282 mg/l and the average suspended solids was 225 mg/l. The average final effluent BOD was 12.2 mg/l representing average removal efficiencies of 95.5%. The average effluent suspended solids was 11.5 mg/l for an efficiency of 94.5%. There was not any significant change in the average BOD; however, there was a substantial increase in suspended solids. On the average of the year's results, the effluent met the Ontario Water Resources Commission objectives of 15 mg/l in the effluent for BOD and suspended solids.

In 1968, mechanical problems became minimal due to continued use of a preventative maintenance program rather than using breakdown maintenance procedures. Some continuing problems have been mentioned in previous reports. These cannot be solved unless a considerable expenditure is made, probably in conjunction with a plant expansion.

The plant staff consisting of a chief operator, assistant chief operator and two operators together with Ontario Water Resources Commission head office staff were successful in operating two plants which maintained an effluent quality within the Ontario Water Resources Commission objectives.

PROJECT COSTS

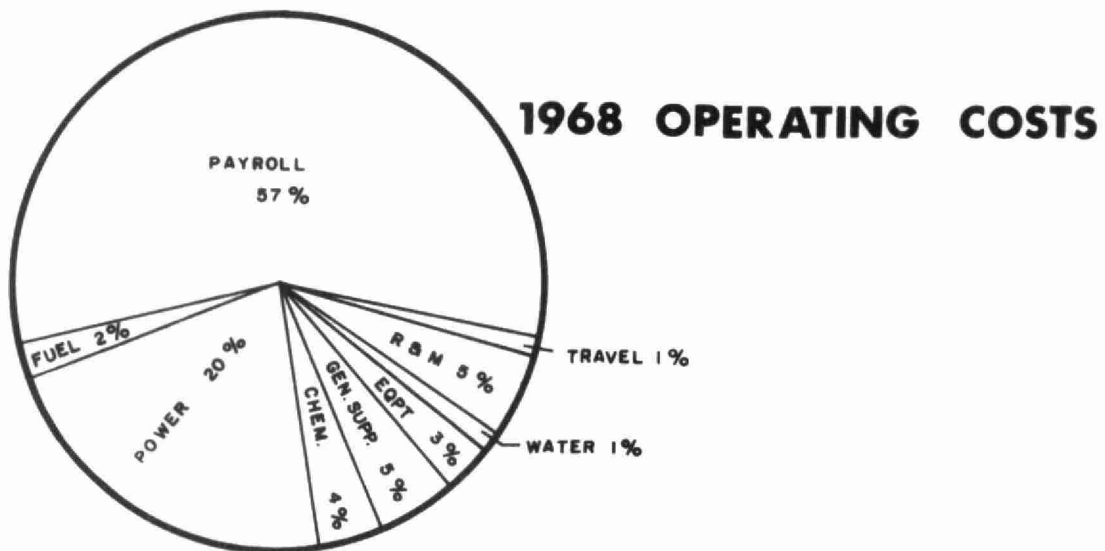
NET CAPITAL COST (Final)		\$694,205.44
DEDUCT - Payments from Municipalities	\$ 37,795.29	
- Portion Financed by CMHC-MDLB (Final)	<u>409,699.75</u>	<u>447,495.04</u>
Long Term Debt to OWRC		<u>\$246,710.40</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1968		\$ <u>32,494.20</u>
Net Operating		\$ 46,216.84
Debt Retirement		4,979.00
Reserve		5,737.98
Interest Charged		<u>13,851.15</u>
TOTAL		\$ <u>70,784.97</u>

RESERVE ACCOUNT

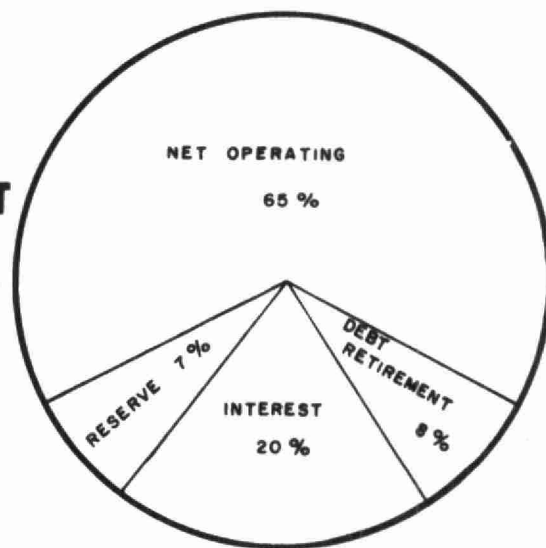
Balance at January 1, 1968	\$ 24,210.83
Deposited by Municipality	5,737.98
Interest Earned	1,563.18
	<u>\$ 31,511.99</u>
Less Expenditures	<u>-</u>
Balance at December 31, 1968	\$ <u>31,511.99</u>

Monthly Operating Costs

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAY ROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY	WATER	TRAVEL
JAN	2896.04	1761.34	-	264.03	718.97	-	32.00	-	53.98	-	51.02	14.70
FEB	2418.26	1748.88	-	166.06	-	-	141.04	283.54	29.79	14.23	-	34.72
MAR	4785.22	2788.32	-	128.61	1212.24	-	303.64	-	138.92	90.97	111.04	11.48
APRIL	2338.48	1872.75	-	-	-	-	94.75	222.64	97.10	26.88	-	24.36
MAY	3889.01	1730.56	-	-	1329.69	378.92	49.26	61.54	186.91	17.85	111.04	23.24
JUNE	2778.39	1730.56	-	-	-	451.37	291.00	37.82	206.76	19.58	-	41.30
JULY	3507.67	1695.66	208.47	-	715.94	39.50	201.76	127.34	358.53	93.63	56.06	10.78
AUG	4299.63	2613.29	414.09	-	717.19	-	125.71	80.45	256.16	-	51.02	41.72
SEPT	3829.82	1695.66	24.98	-	1005.48	720.18	160.07	81.50	26.30	31.32	72.29	12.04
OCT	3523.74	1821.89	-	-	676.80	-	356.86	310.45	225.91	42.80	58.25	30.78
NOV	4782.87	1745.22	-	302.10	997.60	148.37	155.29	86.42	472.96	721.11	68.25	85.55
DEC	7167.71	4532.73	-	-	1894.40	91.84	390.10	-	103.74	-	116.50	38.40
TOTAL	46216.84	25736.86	647.54	860.80	9268.31	1830.18	2301.48	1291.70	2157.06	1058.37	695.47	369.07



TOTAL ANNUAL COST



Yearly Operating Costs

YEAR	M.G.TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER LB OF BOD REMOVED
1964	485.27	\$33,517.36	\$69.06	2 cents
1965	565.53	40,334.44	71.32	2 cents
1966	628.39	42,874.24	68.23	3 cents
1967	621.10	45,987.82	74.04	3 cents
1968	654.82	46,216.84	70.58	3 cents

Process Data

PLANT FLOWS and CHLORINATION

OLD PLANT (No. 1)

MONTH	TOTAL FLOW mg	AVERAGE DAILY FLOW mg	MAXIMUM DAILY FLOW mg	MINIMUM DAILY FLOW mg
JAN	14.04	.453	.717	.175
FEB	11.70	.403	.938	.296
MAR	13.70	.442	.575	.368
APR	16.24	.542	.668	.360
MAY	13.20	.426	.534	.304
JUN	14.16	.472	.974	.317
JUL	15.36	.495	.965	.339
AUG	13.95	.450	.551	.369
SEPT	18.28	.610	1.542	.380
OCT	17.30	.560	.724	.286
NOV	17.46	.582	.654	.397
DEC	10.51	.584	.748	.391
TOTAL	175.90	-	-	-
AVERAGE	-	.480	-	-

COMMENTS

Of the total raw sewage flow, 175.90 mg or 26.9% was diverted to the old plant by use of a flow splitter. The maximum flow treated was 1.54 mg on one day of September. The minimum day flow of 0.175 mg occurred in January. The average flow through the old plant was 0.490 mgd for a load factor of 0.82.

PLANT FLOWS and CHLORINATION

NEW PLANT (No. 2)

MONTH	TOTAL FLOW mg	AVERAGE DAILY FLOW mg	MAXIMUM DAILY FLOW mg	MINIMUM DAILY FLOW mg
JAN	37.60	1.21	1.90	.95
FEB	35.72	1.23	2.42	.97
MAR	35.30	1.14	1.38	.91
APR	38.42	1.28	1.61	1.04
MAY	42.44	1.37	1.53	1.12
JUN	41.91	1.40	2.16	1.12
JUL	38.98	1.26	1.48	.76
AUG	38.29	1.24	1.39	1.14
SEPT	41.12	1.37	1.85	1.07
OCT	40.75	1.32	1.62	.96
NOV	41.86	1.40	2.00	1.05
DEC	46.54	1.50	2.18	1.14
TOTAL	478.93	-	-	-
AVERAGE	-	1.31	-	-

COMMENTS

Of the total raw sewage flow, 478.93 mg or 73.1% was passed through the new plant. The maximum flow treated in any one day was 2.42 mg and the minimum in one day was 0.76 mg. The average flow was 1.31 mgd for a load factor of 0.94.

PLANT FLOWS and CHLORINATION

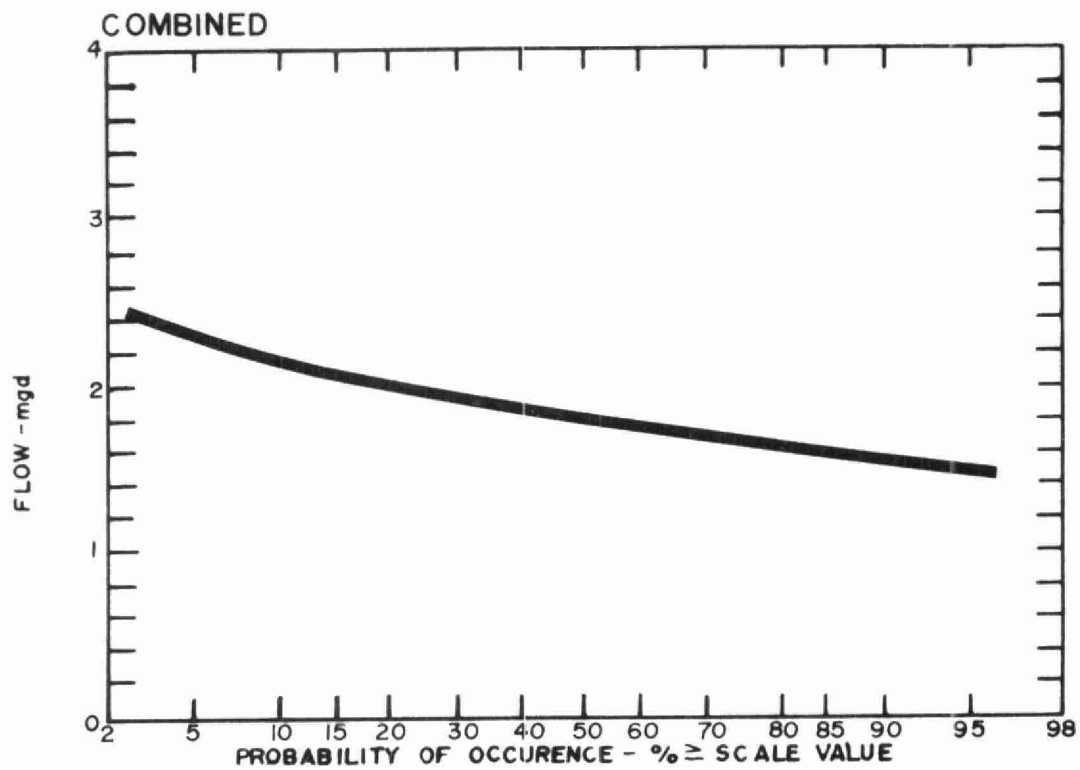
COMBINED

MONTH	TOTAL FLOW mg	AVERAGE DAILY FLOW mg	MAXIMUM DAILY FLOW mg	MINIMUM DAILY FLOW mg	CHLORINE USED 10 ³ lbs.	DOSAGE mg/l
JAN	51.64	1.67	2.62	1.46	0	-
FEB	47.42	1.64	3.36	1.13	0	-
MAR	49.00	1.58	1.89	1.28	0	-
APR	54.66	1.82	2.16	1.54	0	-
MAY	55.64	1.80	1.97	1.49	1.03	3.8
JUN	56.04	1.87	3.14	1.46	2.31	4.1
JUL	54.34	1.75	2.02	1.52	2.23	4.1
AUG	52.25	1.69	1.91	1.45	1.52	3.6
SEPT	59.41	2.00	2.43	1.88	1.86	3.8
OCT	58.05	1.87	2.22	1.40	1.85	3.8
NOV	59.32	1.98	2.88	1.45	0	-
DEC	57.05	1.84	2.44	1.34	0	-
TOTAL	654.82	-	-	-	9.80	-
AVERAGE	-	1.78	-	-	1.96	3.9

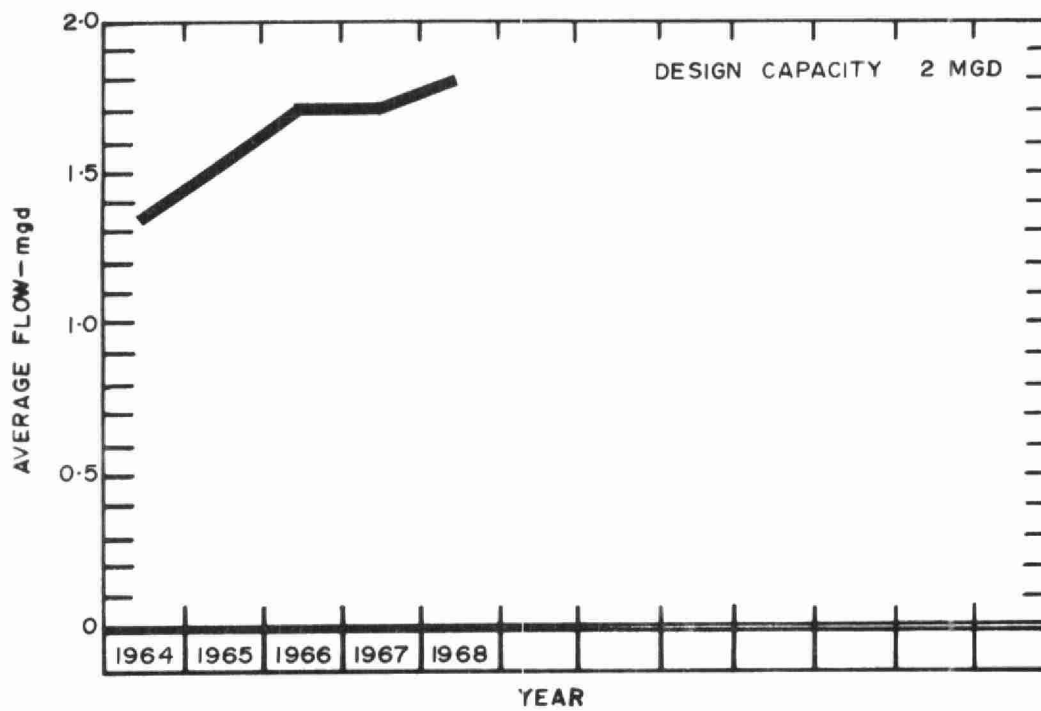
COMMENTS

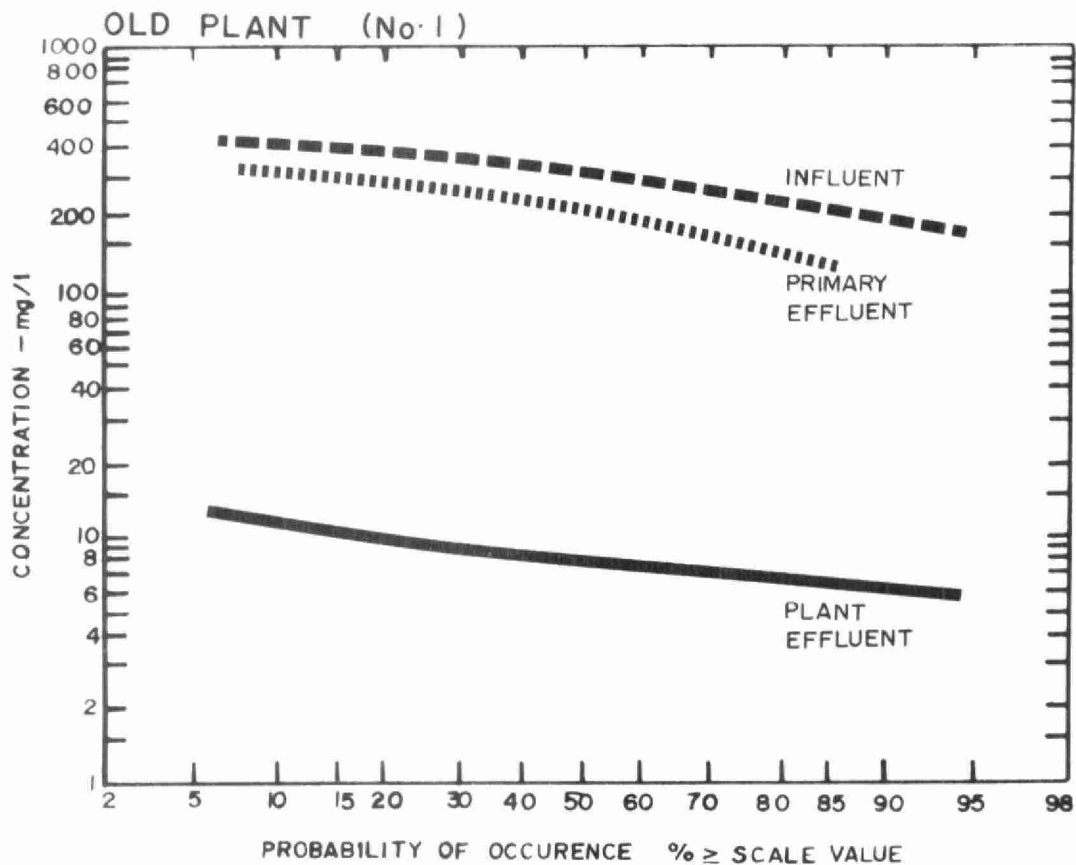
The total flow treated in 1968 was 654.82 mg or an average of 1.78 mgd. This represents a load factor of 0.9 on the entire installation based on design flows. The maximum flow recorded on any one day was 3.36 mg or less than twice design. The minimum flow recorded was 1.13 mg for one day. The probability graph shows that flows exceeded design only 25% of the time.

A total of 9,800 lbs. of chlorine were used from May to October at an average dosage of 3.9 mg/l to maintain the required residual of 0.5 mg/l in the combined effluent of the two plants.

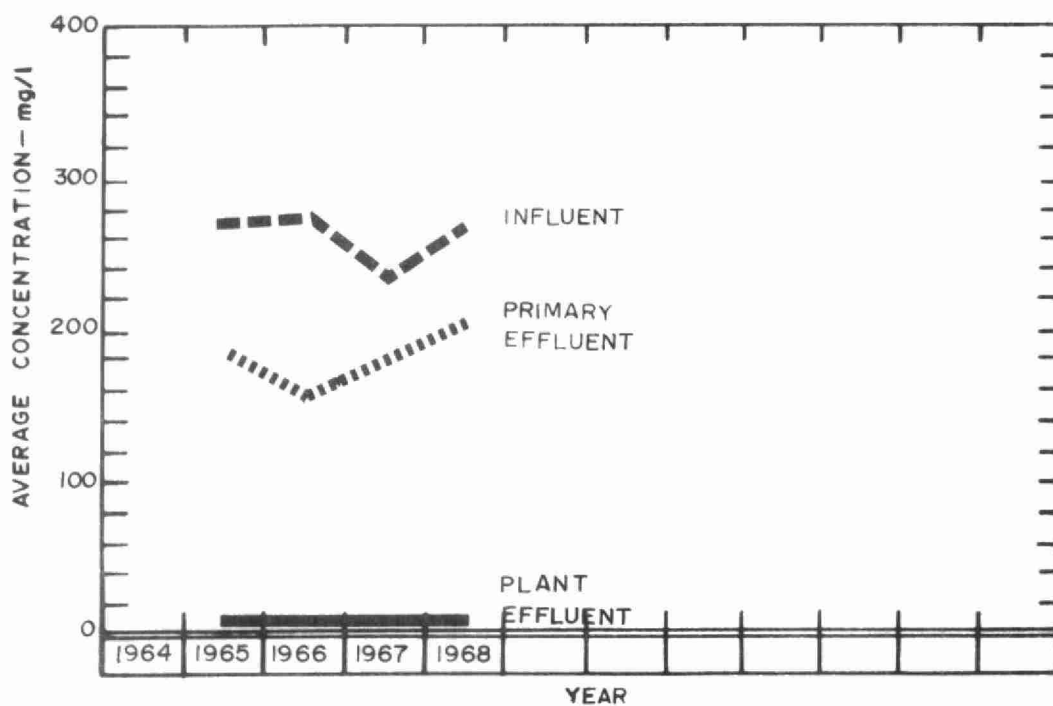


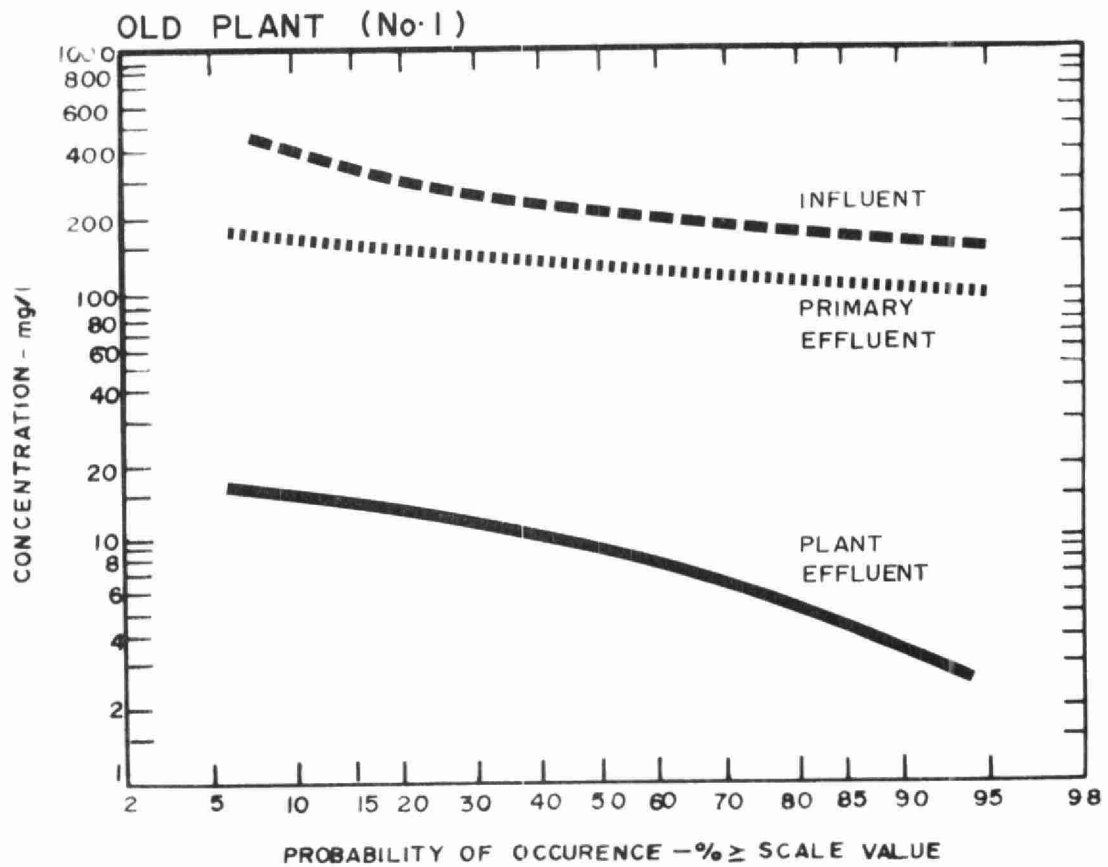
FL O W S



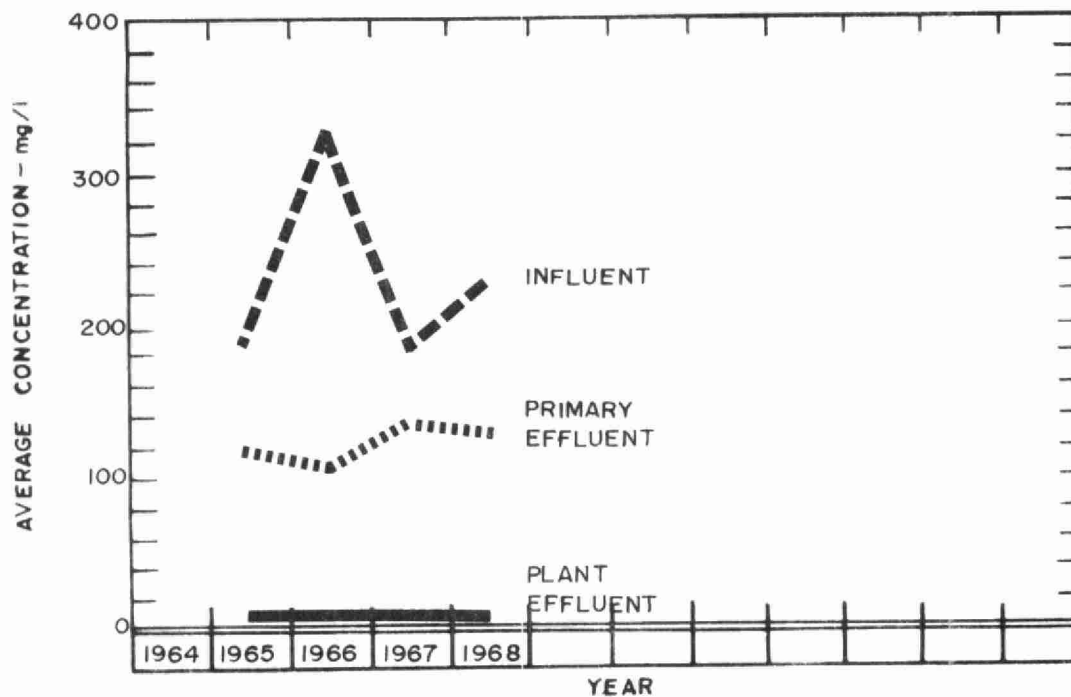


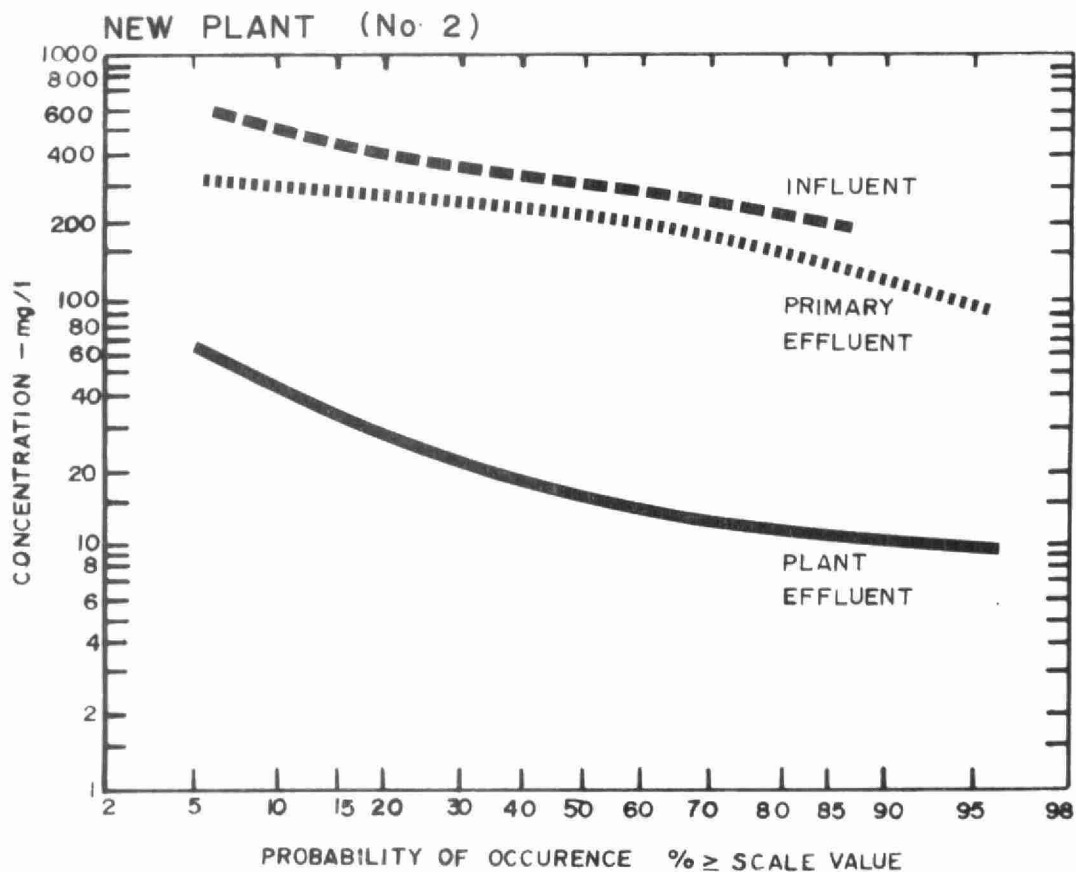
BIOCHEMICAL OXYGEN DEMAND



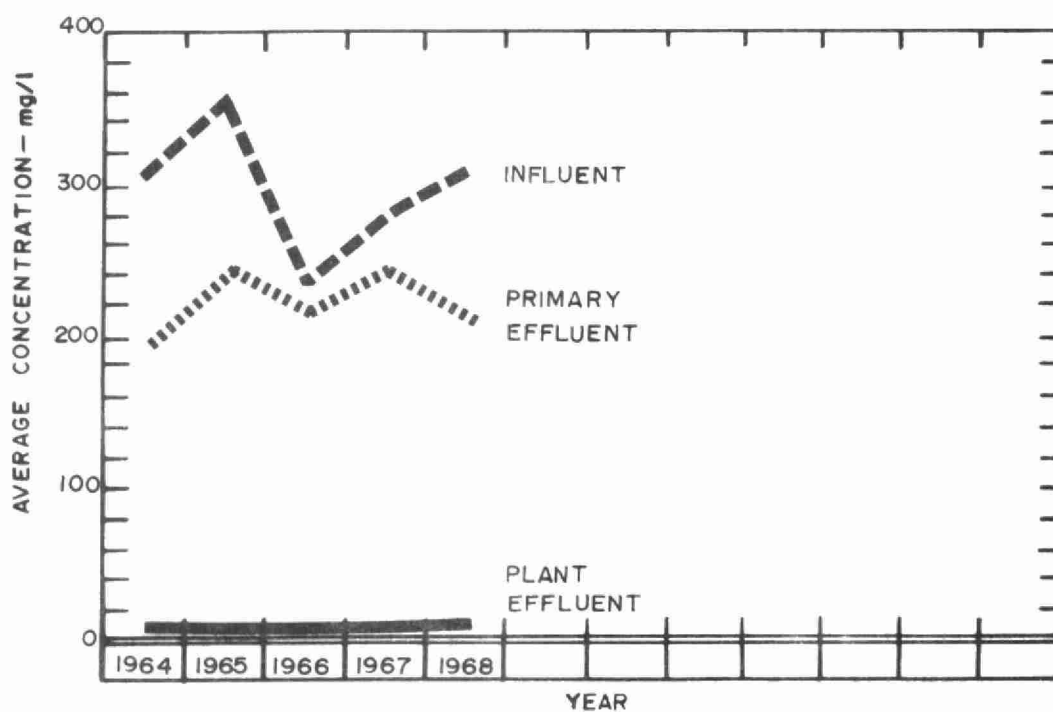


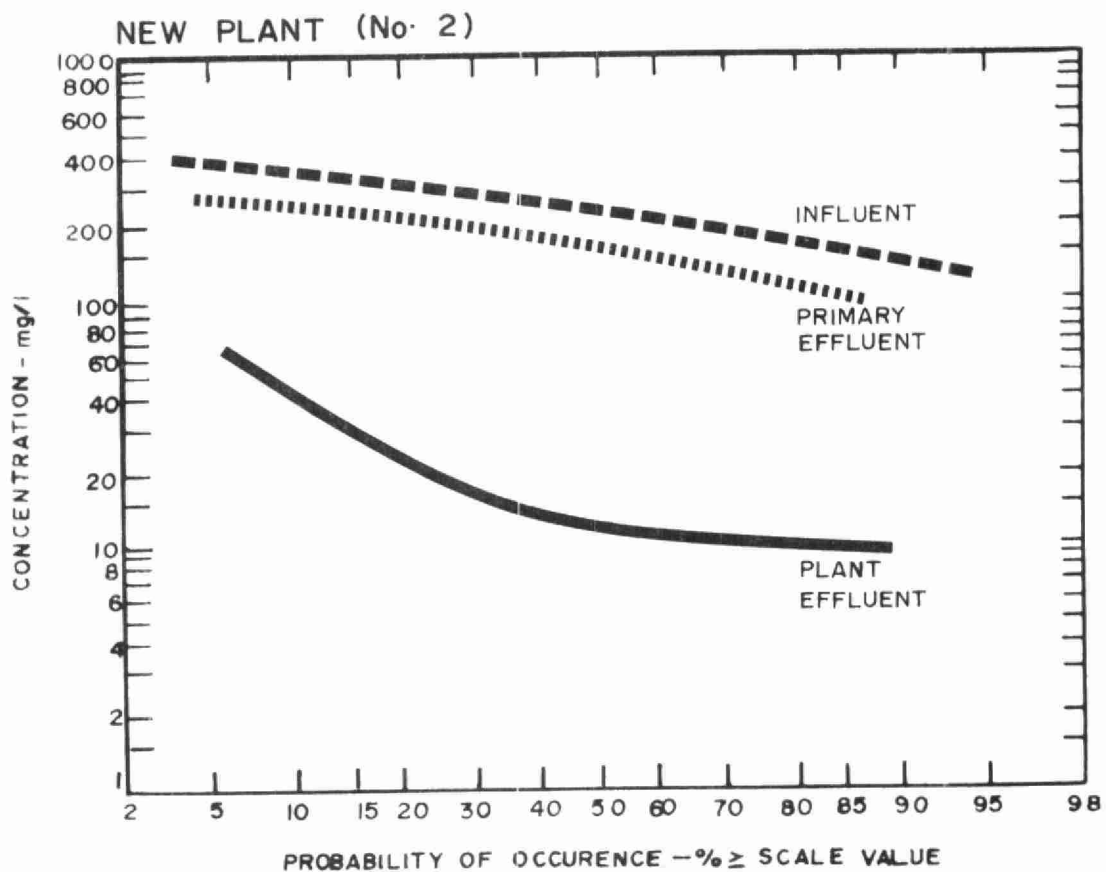
SUSPENDED SOLIDS



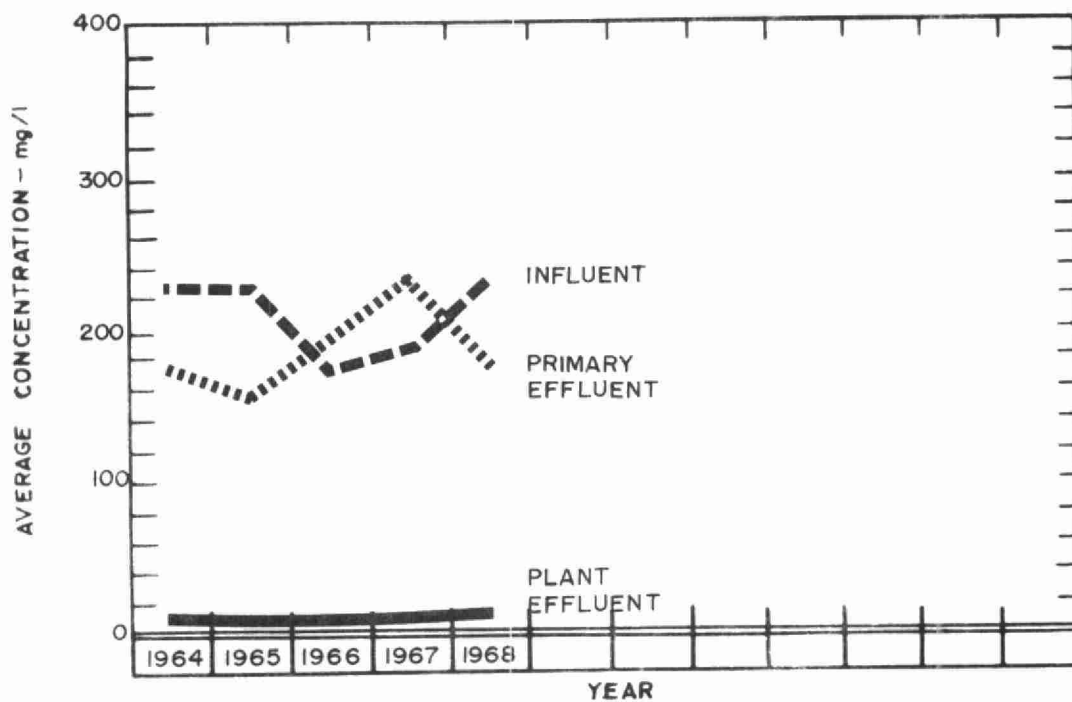


BIOCHEMICAL OXYGEN DEMAND





SUSPENDED SOLIDS



PLANT EFFICIENCY

OLD PLANT (No. 1)

MONTH	BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				GRIT
	INF	EFF	RED ^N	REMOVAL	INF	EFF	RED ^N	REMOVAL	REMOVAL
	CONC ^N mg/l	CONC ^N mg/l	%	10 ³ lb	CONC ^N mg/l	CONC ^N mg/l	%	10 ³ lb	ft ³
JAN	168	9	94	22.3	150	11	93	19.5	34
FEB	255	8	97	20.0	192	1	99	22.3	33
MAR	248	5	98	33.2	274	8	97	36.4	35
APR	315	7	98	50.1	217	2	98	34.9	45
MAY	295	6	98	30.8	189	7	96	24.0	-
JUN	308	8	97	42.5	199	3	98	27.8	40
JULY	-	-	-	-	-	-	-	-	42
AUG	118	8	93	15.4	154	6	96	20.6	39
SEPT	172	6	96	30.4	117	6	95	20.3	41
OCT	327	7	98	55.4	263	10	96	43.8	50
NOV	415	13	97	70.2	300	16	95	59.6	54
DEC	325	6	98	33.5	430	11	97	44.0	45
TOTAL	-	-	-	-	-	-	-	-	-
AVERAGE	268	8	97	36.7	226	7	97	32.1	42

COMMENTS

The raw sewage samples collected for this plant showed an average organic loading of 268 mg/l BOD and 226 mg/l suspended solids. The average effluent values of 8 mg/l BOD and 7 mg/l suspended solids were lower than the 1967 values. The efficiency of this plant increased from 95.7% to 97% for BOD removal and from 94.1% to 97% for suspended solids removal.

The grit removed from the total sewage flow to both plants averaged 42 cubic feet per month as compared to 36 cubic feet in 1967. This represents a removal of 0.8 cubic feet per million gallons of sewage and can be considered normal.

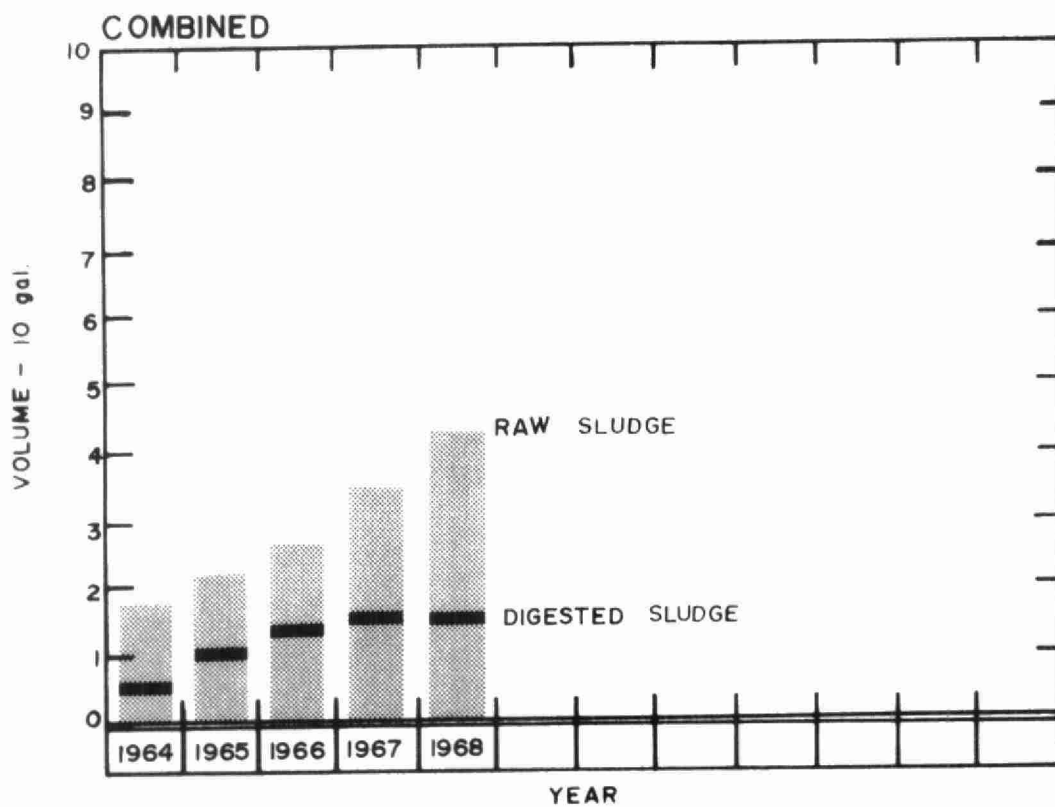
PLANT EFFICIENCY

NEW PLANT (No. 2)

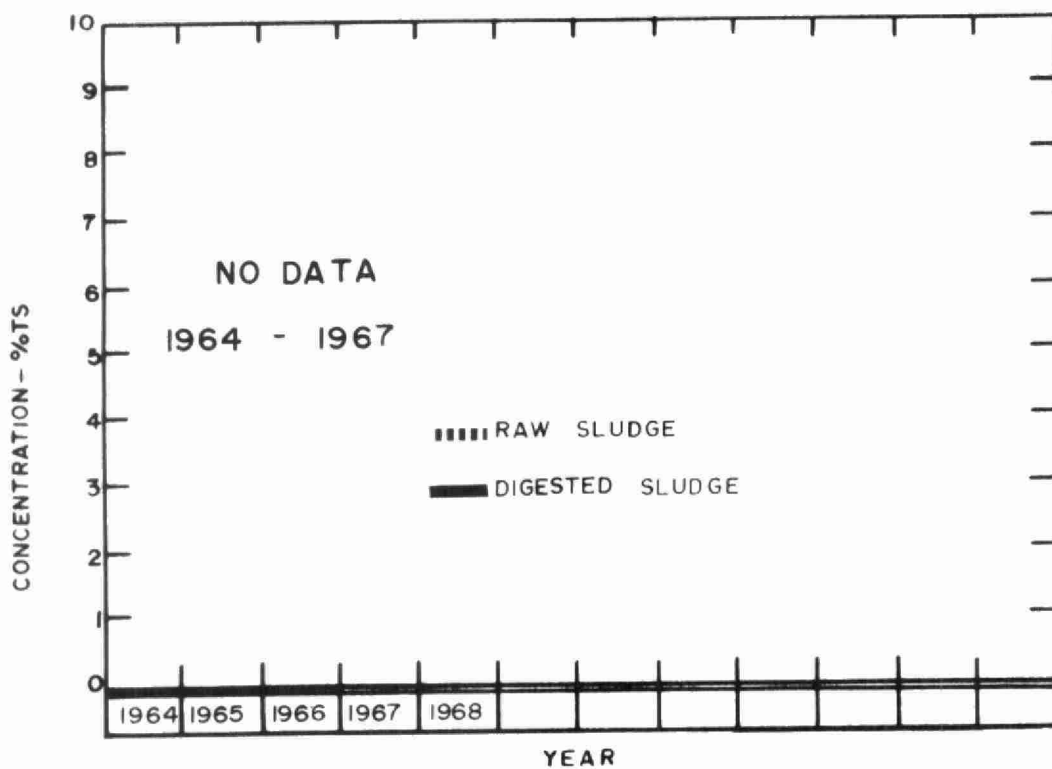
MONTH	BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				GRIT
	INF CONC ^N mg/l	EFF CONC ^N mg/l	RED ^N %	REMOVAL 10 ³ lb	INF CONC ^N mg/l	EFF CONC ^N mg/l	RED ^N %	REMOVAL 10 ³ lb	REMOVAL ft ³
JAN	170	10	94	60.2	220	13	94	77.8	-
FEB	252	13	95	85.4	204	8	96	70.0	-
MAR	302	12	96	102.4	184	6	97	62.8	-
APR	292	17	94	105.6	198	8	96	73.0	-
MAY	455	10	98	189.0	267	8	97	109.9	-
JUN	535	56	90	200.7	297	54	82	101.8	-
JULY	184	22	88	63.7	106	25	76	31.5	-
AUG	268	9	97	99.2	305	9	97	113.3	-
SEPT	290	11	96	114.7	141	3	98	56.7	-
OCT	-	-	-	-	-	-	-	-	-
NOV	400	9	98	163.7	368	10	97	150.0	-
DEC	283	22	92	121.5	239	20	92	101.9	-
TOTAL	-	-	-	-	-	-	-	-	-
AVERAGE	312	17	94	118.7	230	15	93	86.2	-

COMMENTS

The samples collected for this plant showed an average organic loading of 213 mg/l BOD and 230 mg/l suspended solids in the raw sewage. The average effluent values of 17 mg/l BOD and 15 mg/l suspended solids are higher than normal due to one poor sample in June and may not be considered representative of the normal performance of the plant. There is a corresponding slight decrease in the apparent efficiency of the plant from the 1967 values of 96.5% for BOD and 93.1% for suspended solids.



DIGESTION



SLUDGE DIGESTION and DISPOSAL

COMBINED

MONTH	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT		SLUDGE DISPOSAL	
	VOLUME 10 ⁵ gal	T. S. %	V. S. %	VOLUME 10 ⁵ gal	T. S. %	V. S. %	VOLUME 10 ⁵ gal	T. S. %	LIQUID yd ³	DEWATERED yd ³
JAN	1.21	-	-	0	-	-	1.02	-	0	0
FEB	1.95	4.6	72	.95	2.2	59	.10	1.3	0	0
MAR	2.54	4.4	76	.83	2.2	60	0	-	0	0
APR	2.47	3.7	77	1.54	3.5	59	0	-	0	0
MAY	3.68	-	89	.89	-	-	0	-	0	0
JUN	8.30	-	-	2.08	-	-	.67	-	0	0
JUL	1.66	3.1	71	1.12	2.2	64	.03	-	0	0
AUG	2.84	2.9	75	1.76	3.1	65	.03	-	0	0
SEPT	3.21	-	-	1.63	-	-	0	-	0	0
OCT	4.89	3.9	74	1.31	-	-	0	-	0	0
NOV	5.29	2.2	59	1.96	3.0	55	0	-	0	0
DEC	4.47	-	-	1.51	3.3	66	0	-	0	0
TOTAL	42.51	-	-	15.58	-	-	1.85	-	0	0
AVERAGE	3.54	3.5	74	1.30	2.8	61	.15	1.3	0	0

COMMENTS

A total of 4,251,000 gallons of raw sludge was pumped to the digester in 1968 as opposed to 3,493,692 gallons in 1967. This is an increase of 22% and is once again indicative of the relatively high organic loading at this plant. A total of 1,558,000 gallons of digested sludge or 36.5% of the original sludge volume was disposed of in the Town operated sludge drying beds adjacent to the plant.

No sludge was hauled by truck at this project. The volatile content of the sludge was reduced by 45%. The gas produced in the digester was used in the plant boiler for heating, and the excess was burned as a waste product.

AERATION

OLD PLANT (No. 1)

MONTH	AVERAGE FLOW mgd	PRIMARY EFF		SECONDARY EFF		MLSS CONC ^N mg/l	F/M $\left(\frac{\text{lb BOD}}{\text{lb MLSS}}\right)$	AIR USED $\left(\frac{1000 \text{ ft}^3}{\text{lb BOD}}\right)$ REMOVED	WASTE SLUDGE lb
		BOD CONC ^N mg/l	SS CONC ^N mg/l	BOD CONC ^N mg/l	SS CONC ^N mg/l				
JAN	.453	140	110	9	11	3620	0.15	2.91	-
FEB	.403	155	86	8	1	3250	0.16	6.01	-
MAR	.442	112	111	5	8	2090	0.19	3.66	-
APRIL	.542	310	164	7	2	2670	0.52	1.05	-
MAY	.426	252	141	6	7	2840	0.32	1.64	-
JUN	.472	260	135	8	3	2930	0.34	1.40	-
JUL	.495	-	-	-	-	2940	-	-	-
AUG	.450	110	112	8	6	2350	0.17	4.65	-
SEPT	.610	150	112	6	6	3117	0.12	3.21	-
OCT	.560	200	192	3	5	3357	0.14	3.14	-
NOV	.582	288	140	13	16	1761	0.39	1.44	-
DEC	.584	242	164	6	11	2625	0.28	1.00	-
TOTAL	-	-	-	-	-	-	-	-	-
AVERAGE	.480	202	133	8	7	2795	0.25	2.73	-

COMMENTS

An average organic loading of 202 mg/l BOD and 133 mg/l suspended solids was received at the old plant in 1968. The 1967 value for BOD was 176 mg/l. The average BOD and suspended solids in the effluent were 8 mg/l and 7 mg/l respectively and were well within the Ontario Water Resources Commission objective of 15 mg/l for each. The average MLSS value of 2795 mg/l was close to the 1967 value of 2839 mg/l and resulted in an average loading of 0.25 lbs. of BOD per lb. of MLSS. An average of 2795 cubic feet of air was supplied per lb. of BOD removed. The air supplied is greater than in some other secondary plants due to the inefficient type of diffusers used to distribute the air.

AERATION

NEW PLANT (No. 2)

MONTH	AVERAGE FLOW mgd	PRIMARY EFF		SECONDARY EFF		MLSS CONC ^N mg/l	F/M ($\frac{\text{lb BOD}}{\text{lb MLSS}}$)	AIR USED ($\frac{1000 \text{ ft}^3}{\text{lb BOD REMOVED}}$)	WASTE SLUDGE lb
		BOD CONC ^N mg/l	SS CONC ^N mg/l	BOD CONC ^N mg/l	SS CONC ^N mg/l				
JAN	1.21	116	116	10	13	3290	.13	5.59	-
FEB	1.23	153	210	13	8	3790	.08	4.17	-
MAR	1.14	158	148	12	6	3460	.13	4.66	-
APRIL	1.28	158	105	17	8	3180	.17	4.21	-
MAY	1.37	320	196	10	8	2800	.41	2.59	-
JUN	1.40	290	175	56	54	2700	.39	4.40	-
JUL	1.26	198	106	22	25	2500	.26	6.52	-
AUG	1.24	200	115	9	9	2320	.28	6.10	-
SEPT	1.37	275	173	11	3	3270	.30	3.85	-
OCT	1.32	-	-	-	-	3410	-	-	-
NOV	1.40	280	208	9	10	1320	.78	3.81	-
DEC	1.50	177	174	22	20	2400	.28	4.32	-
TOTAL	-	-	-	-	-	-	-	-	-
AVERAGE	1.31	211	177	17	15	2870	.29	4.57	-

COMMENTS

An average organic loading of 211 mg/l BOD and 177 mg/l suspended solids was received at the new plant in 1968. The 1967 value for BOD was 242 mg/l. Excluding the June sample which is considered to be erroneous, the average BOD and suspended solids in the effluent was 13.5 mg/l and 11 mg/l respectively and were within the Ontario Water Resources Commission objective of 15 mg/l for each.

The average MLSS value of 2870 mg/l was close to the 1967 value of 2847 mg/l and the F/M ratio of .29 compares with the 1967 value of .30 lbs. of BOD per lb. of MLSS. An average of 4570 cubic feet of air was supplied per lb. of BOD removed. The air requirement of the Inka system appears to be considerably higher than for the conventional process used in plant No. 1.

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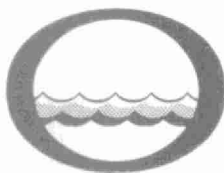
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CONCLUSIONS

Again in 1968 the combined plants at Simcoe operated efficiently and produced an effluent which met OWRC objectives. The cost per million gallons of \$70.58 was within the range normally anticipated for this type of operation.

Date Due

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Water management in Ontario